JOHN WAIHEE
GOVERNOR OF HAWAII



JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EMD-CAB

April 18, 1990

90-A165
File Nos. 833 and 834

Mr. Manabu Tagomori
Water & Land Development Division
Department of Land & Natural Resources
1151 Punchbowl Street, Room 227
Honolulu, HI 96813

Dear Mr. Tagomori:

Subject: Modification to Authority to Construct Permits
Regulating the Emissions of Air Pollutants
Puna Geothermal Venture
25 MW Geothermal Power Plant and Wellfield

On March 16, 1990, the Department of Health modified the Authority to Construct air permits, Nos. A-833-795 and A-834-796, which were issued to Puna Geothermal Venture on February 6, 1990 for the fourteen (14) geothermal wells and the 25 MW geothermal power plant. The special conditions to the corresponding air permits were modified for clarification purposes and to minimize any misinterpretations.

For your information, a copy of the modifications to the air permits is enclosed.

Your continued interest is welcomed and appreciated.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director for
Environmental Health

WN/sk
Enclosures
cc: DHSA, Hawaii

**CERTIFIED MAIL**
**RETURN RECEIPT REQUESTED**

March 16, 1990

90-A99
File #833

Mr. Maurice A. Richard
Regional Development Manager
Puna Geothermal Venture
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720

Dear Mr. Richard:

Subject: Modification to Authority to Construct No. A-833-795
Fourteen (14) Geothermal Exploratory/Development Wells
Located at TMK: 1-4-01:2, 1-4-01:3, 1-4-01:58 and 1-4-01:19,
Kilauea Lower East Rift Zone, Puna, Hawaii

Pursuant to Chapter 342B, Hawaii Revised Statutes, and Chapter 11-60, Hawaii Administrative Rules, the Department of Health (DOH) hereby modifies the subject Authority to Construct No. A-833-795.

The following modified special conditions supersede the corresponding special conditions of Attachment II issued with ATC No. A-833-795 dated February 6, 1990:

Special Condition No. 2

This Authority to Construct is for fourteen (14) geothermal exploratory/developmental wells to be drilled in TMK: 1-4-01:2, 1-4-01:3, 1-4-01:58 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii. Written notification must be submitted to and approval obtained from the Department of Health prior to the commencement of construction of each well. The Department of Health shall act on the approval in a timely manner provided all required and requested information have been submitted. Each notification shall include a drawing identifying the well location, the property boundary, access roads approaching and traversing the property, the location of the nearest residence, and the locations of the air quality monitoring stations. The status of all previous constructed wells shall be provided including a clear description of the measures taken to shut-in the well. Additional information may be requested of the permittee.

Special Condition No. 3

The permittee shall obtain a Permit to Operate prior to any well approved under this permit being connected to and becoming a part of a distribution system which supplies geothermal resource to a power plant or facility. Additional permit conditions may be included in the Permit to Operate.

Special Condition No. 5

The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the 25 MW power plant may be used towards fulfilling this requirement.

Prior to the commencement of construction of each of the fourteen (14) wells, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of drilling operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. At a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

The air quality monitors shall be equipped with an alarm system or an acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide concentrations in excess of 25 ppb (above background) and 100 ppb (including background) on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of any exceedance above 25 ppb (above background) and 100 ppb (including background) on a one-hour average.

Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

Special Condition No. 9

Flaring of excess hydrogen sulfide gas from the completed wells is prohibited without the approval of the Department of Health. If flaring of the excess gas is considered necessary, the permittee must submit a written request to the Department of Health which shall include as a minimum the proposed date, time and approximate duration of the flaring episode, the current and expected well head pressure, the estimated hydrogen sulfide concentration in the well gas, the estimated emission rates for hydrogen sulfide and sulfur dioxide, an air quality impact analysis for sulfur dioxide, the probable cause of excess gas buildup, and an assessment of any abatement alternatives.

If a request to flare excess gas is approved as necessary by the Department of Health, the approval may be subject to specified conditions. These conditions may include, but are not limited to, provisions requiring the permittee to install, operate, and maintain sulfur dioxide ambient monitors and to submit to the Department of Health after the flaring event a report on the times flaring actually occurred, the sulfur dioxide emissions determined through either direct or indirect measurements, and any problems encountered during the flaring process.

Special Condition No. 11

The permittee shall have proper safety devices on-site at least three days prior to commencement of drilling operations. A minimum of three breathing apparati shall be available at the site and maintained by a qualified person/contractor. Wind socks shall be placed at two opposite edges of the drill site and on the drill floor. At least one person with certified hydrogen sulfide training to respond to hydrogen sulfide emergency episodes shall be on-site at all times.

Special Condition No. 13

The permittee shall monitor the hydrogen sulfide concentration and emission rate continuously in the steam by use of an electrochemical type sensor and recorder during the flow testing operations. If the abated hydrogen sulfide emission rate increases to five (5.0) pounds per hour or more, the permittee shall cease operations and shut-in the well. The Department of Health shall be so notified and the problem corrected before testing operations can continue.

During periods of well equipment failure or malfunction which result in hydrogen sulfide emissions, the permittee shall apply best available control technology for the air emissions and take immediate steps to correct the condition. The Department of Health shall be immediately notified of the well equipment failure or malfunction. If the well equipment in question cannot be repaired within twenty-four (24) hours of the occurrence or the hydrogen sulfide ambient

concentration exceeds the specified limits in Special Condition Nos. 23, 27 and 28, the permittee shall cease operations and shut-in the well in accordance with Special Condition Nos. 23, 27 and 28. Within five (5) days of the occurrence, a report shall be submitted to the Department of Health. The report shall include a description of the equipment failure or malfunction, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the repairs conducted to restore normal operations. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule, or order which results from the well equipment failure or malfunction.

Special Condition No. 17

The permittee shall utilize mud drilling techniques to the extent possible during the well drilling operations. In no case shall air drilling be used in the construction of the geothermal well. The drilling with aerated mud or aerated water may be used in lieu of mud drilling, but should be minimized to the extent practicable. Should any releases of steam occur during the drilling operations, the drilling fluid weight shall be immediately increased to stop the steam flow. In no case shall any inadvertent steam releases result in hydrogen sulfide emissions of five (5.0) pounds per hour or more, or exceed seven (7) minutes in duration in any one hour. If the inadvertent steam releases cannot be controlled by increasing the fluid weight or exceeds seven (7) minutes in duration in any one hour, the permittee shall take immediate action to shut-in the well.

Records of each steam release incident shall be maintained and include as a minimum, date, time and duration of the incident, the estimated resultant emissions, and any corrective measures taken. The records shall be in a permanent form suitable for inspection, shall be made available upon request by the Department of Health, and shall be retained for at least three (3) years following the date of such records.

Special Condition No. 22

Unabated well venting shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for optimal dispersion and minimal air quality impact. In no case shall the well venting commence if the average wind speed at the well site is less than 4 meters per second (8.9 miles per hour). Prior to well venting, the Department must be informed in writing a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum

of 24-hours in advance of open venting of each well and pipeline cleanout. In preparation for flow testing, each well shall be allowed to open vent only during the daytime and no more than a total of four (4) hours.

In no case shall any well venting coincide with any pipeline cleanouts, or well flow testing operations, or commence if the power plant emergency steam release facility is being utilized. If emergency steam releases from the power plant occur during the venting of any well, venting of that well shall be terminated as quickly as practical.

Special Condition No. 23

In no case shall the well drilling, flow testing, venting operations, or well equipment failure or malfunction of any of the fourteen (14) geothermal exploratory/developmental wells cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average at or beyond the project boundary. Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 100 ppb (including background) on a one-hour average, the permittee shall immediately notify the Department of Health, ceasing all well drilling with aerated mud or aerated water, well flow testing, and well venting operations, and shutting in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected wellfield construction activities shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the contributions from the well drilling with aerated mud or aerated water, well flow testing, well venting operations or well equipment repair will not result in or contribute to the exceedance of the hydrogen sulfide ambient concentration of 100 ppb (including background) on a one-hour average.

The permittee shall submit to the Department of Health a written follow-up report within five (5) days of the occurrence. The report shall include the date, time and duration of the exceedance(s), the status of all project operations during the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense to any violation(s) of this permit or of any law or regulations.

Special Condition No. 27

During those periods of normal power plant and normal wellfield operations, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the

hydrogen sulfide ambient concentration in excess of 5 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report. As used in this context, a normal power plant operation is a power plant which is operating without any upsets, equipment failure, malfunction or which is otherwise operating normally. A normal wellfield operation is a wellfield in which no well drilling, flow testing, or venting activities are occurring and where the completed wells are not experiencing any equipment failure or malfunction and are either shut-in, being used as an injection well, or connected to a sound geothermal resource distribution system.

Special Condition No. 28

Excluding periods of well venting and pipeline cleanout, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report.

Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 25 ppb (above background) on a one-hour average, the permittee shall immediately notify the Department of Health and the Hilo District Health Office and shall cease all geothermal well drilling with aerated mud or aerated water, well flow testing, and scheduled project maintenance, and shut-in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected well drilling, flow testing, scheduled maintenance, and well equipment repair shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the hydrogen sulfide emissions from the affected well drilling, flow testing, scheduled maintenance, well equipment or power plant repairs, power plant emergency steam release, or normal power plant operation, whether separately or in any combination, did not or will not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average.

The following special condition of Attachment II issued with ATC No. A-833-795 dated February 6, 1990 is hereby deleted:

Special Condition No. 24

The drilling, flow testing, and venting operations of any of the fourteen (14) geothermal exploratory/developmental wells shall not cause or contribute to an

exceedance of the hydrogen sulfide ambient level of 100 ppb on a one-hour average at or beyond the project boundary.

All other special conditions of Attachment II (Special Condition Nos. 1, 4, 6, 7, 8, 10, 12, 14, 15, 16, 18, 19, 20, 21, 25 and 26) issued with ATC No. A-833-795 dated February 6, 1990 shall not be affected and shall remain valid.

These modifications shall become final twenty (20) days after receipt, unless before the twenty (20) days expire, Puna Geothermal Venture submits a written request to the Director of Health for a hearing pursuant to Chapters 91 and 342B, Hawaii Revised Statutes. If a hearing is requested, it will be held at a date, time, and place to be specified later and conducted in accordance with Chapter 91, Hawaii Revised Statutes, and the rules of Practice and Procedure of the Department of Health.

Very truly yours,

JOHN C. LEWIN, M.D.
Director of Health

WN/sk
cc: DHSA, Hawaii

Dear

COPY FOR YOUR INFORMATION

March 16, 1990
Ramseyer

**ATTACHMENT II. SPECIAL CONDITIONS OF AUTHORITY TO CONSTRUCT, NO. A-833-795**
**APPLICATION NO. A-833**
**WELLFIELD**

In addition to the standard conditions of the Authority to Construct, this permit is subject to the following special conditions:

1. The permit conditions prescribed herein may at any time be revised by the Department of Health to conform to any Federal or State promulgated air quality rules on geothermal facilities.

2. This Authority to Construct is for fourteen (14) geothermal exploratory/developmental wells to be drilled in TMK: 1-4-01:2, 1-4-01:3, 1-4-01:58 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii. Written notification must be submitted to and approval obtained [with minimal delay] from the Department of Health prior to commencement of construction of each well. **The Department of Health shall act on the approval in a timely manner provided all required and requested information have been submitted.** Each notification shall include a drawing identifying the well location, the property boundary, access roads approaching and traversing the property, the location of the nearest residence, and the locations of the air quality monitoring stations. The status of all previous constructed wells shall be provided including a clear description of the measures taken to shut-in the well. Additional information may be requested of the permittee.

3. The [Department of Health shall act on] **permittee shall obtain** a Permit to Operate [Application] prior to any well approved under this permit being connected and becoming a part of a distribution system which supplies geothermal resource to a power plant or facility. Additional permit conditions may be included in the Permit to Operate.

4. No geothermal exploratory/developmental wells shall be located within 600 feet of the property boundary. If any federal, state or county permit or order stipulates a distance greater than 600 feet in which no geothermal wells can be located, the greater distance shall so apply.

5. The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the 25 MW power plant may be used towards fulfilling this requirement.

   Prior to the commencement of construction of each of the fourteen (14) wells, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of drilling operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. At a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

   The air quality monitors shall be equipped with an alarm system or an acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide

concentrations in excess of 25 ppb **(above background)** and 100 ppb **(including background)** on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of any exceedance above **25 ppb (above background) and** 100 ppb **(including background) on a one-hour average.**

Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

6. At the discretion of the Director of Health, the permittee may at any time be required to install, operate, and maintain additional air quality and meteorological monitoring stations, but only after due notice to the permittee on the reasons for the proposed change and providing the permittee an opportunity to respond within seven (7) days.

7. The permittee shall notify the Department of Health in writing at least two (2) working days prior to the commencement, and within two (2) working days after the completion of the aerated mud or aerated water drilling, well venting, and flow testing operations, for each geothermal well.

8. Upon completion of flow testing operations, each geothermal well shall be shut-in or otherwise prevented from discharging to the atmosphere in accordance with appropriate standards of operation and maintenance and at no time be placed on continuous or standby bleed status.

9. [Occasional flaring of excess hydrogen sulfide gas from the completed wells is prohibited unless such flaring is necessary to insure well integrity or safety and is conducted in such a manner that no state or national ambient air quality standards for sulfur dioxide are exceeded. Records shall be maintained on all flaring episodes, and shall include, as a minimum, the date, time and duration of the event, probable causes of the excess gas buildup, and the estimated emissions of sulfur dioxides determined through either direct or indirect measurements. The records shall be in a permanent form suitable for inspection and shall be retained for at least three (3) years following the date of such records. The permittee shall submit a written report monthly to the Department of Health on the flaring episodes which demonstrates compliance with the requirements of this condition. If flaring occurs frequently or routinely, the permittee shall install, operate, and maintain ambient sulfur dioxide monitors at each air quality monitoring station and comply with all recordkeeping requirements in accordance with Special Condition No. 5.]

**Flaring of excess hydrogen sulfide gas from the completed wells is prohibited without the approval of the Department of Health. If flaring of the excess gas is considered necessary, the permittee must submit a written request to the Department of Health which shall include as a minimum the proposed date, time and approximate duration of the flaring episode, the current and expected well head pressure, the estimated hydrogen sulfide concentration in the well gas, the estimated emission rates for hydrogen sulfide and sulfur dioxide, an air quality impact analysis for sulfur dioxide, the probable cause of excess gas buildup, and an assessment of any abatement alternatives.**

**If a request to flare excess gas is approved as necessary by the Department of Health, the approval may be subject to specified conditions. These conditions may**

**include, but are not limited to, provisions requiring the permittee to install, operate, and maintain sulfur dioxide ambient monitors and to submit to the Department of Health after the flaring event a report on the times flaring actually occurred, the sulfur dioxide emissions determined through either direct or indirect measurements, and any problems encountered during the flaring process.**

10. All access roads into the property shall be limited to authorized personnel only. Twenty-four hour staffing shall be in place during construction.

11. The permittee shall have proper safety devices on-site at least three days prior to commencement of **[**air**]** drilling **operations**. A minimum of three breathing apparati shall be available at the site and maintained by a qualified person/contractor. Wind socks shall be placed at two opposite edges of the drill site and on the drill floor. At least one person with certified hydrogen sulfide training to respond to hydrogen sulfide emergency episodes shall be on-site at all times.

12. Hydrogen sulfide abatement equipment with a minimum of 3,000 gallons of sodium hydroxide shall be on the property prior to the initiation of flow testing operations. Chemical storage tanks shall be maintained with sodium hydroxide at all times with no less than a three-day operating supply.

13. The permittee shall monitor the hydrogen sulfide concentration and emission rate continuously in the steam by use of an electrochemical type sensor and recorder during the flow testing operations. If the abated hydrogen sulfide emission rate increases to five (5.0) pounds per hour or more, the permittee shall cease operations and shut-in the well. The Department of Health shall be so notified and the problem corrected before testing operations can continue.

    During periods of **well** equipment failure or malfunction which result in hydrogen sulfide emissions, the permittee shall apply best available control technology for the air emissions and **[**shall so notify the Department of Health within one (1) hour of the occurrence. The permittee shall immediately**]** take **immediate** steps to correct the condition. **The Department of Health shall be immediately notified of the well equipment failure or malfunction.** If **[**repairs**]** **the well equipment in question** cannot be **[**accomplished**]** **repaired** within twenty-four (24) hours of the occurrence **or the hydrogen sulfide ambient concentration exceeds the specified limits in Special Condition Nos. 23, 27 and 28,** the permittee shall cease operations and shut-in the well **in accordance with Special Condition Nos. 23, 27 and 28.** Within five (5) days of the occurrence, a report shall be submitted to the Department of Health **[**in accordance with Hawaii Administrative Rules, Section 11-60-14]. **The report shall include a description of the equipment failure or malfunction, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the repairs conducted to restore normal operations. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule, or order which results from the well equipment failure or malfunction.**

14. Wet chemical tests for the determination of the hydrogen sulfide concentrations shall be conducted and recorded on a daily basis during all phases of the flow testing operations.

15. The following data shall be recorded during the flow testing operations:

    a. At least four times per 24-hour period, hydrogen sulfide ppm upstream from the injection system.

b. At least four times per 24-hour period, injection rate of sodium hydroxide.

c. At least four times per 24-hour period, hydrogen sulfide emission rate (lbs/hr) and concentration (ppm) downstream, after chemical injection.

d. Daily, zero and span check of hydrogen sulfide sensor.

e. Weekly, calibration check of hydrogen sulfide sensor.

f. Daily, the quantity of sodium hydroxide remaining in the abatement equipment storage tanks.

Additional entries will be made when significant changes in the resource occurs and when changes are made in injection rates of sodium hydroxide.

The aforementioned daily records a., b., and c. shall also be reported daily to the Department of Health by telephone no later than noon of the following work day. The Department of Health may at any time request additional data or revise the frequency of this daily telephone reporting requirement.

The records shall be kept at the well location at all times during the drilling and flow testing operations and shall be made available upon request by the Department of Health or its duly authorized representative. Copies or summaries of the records shall be provided within a reasonable time upon request by the Department of Health. The records shall be retained for at least three years following the date of such records.

16. The permittee shall maintain a 24-hour telephone service to accept calls concerning this Authority to Construct. This telephone number must be operational prior to commencement of construction.

17. The permittee shall utilize mud drilling techniques to the extent possible during the well drilling operations. In no case shall air drilling be used in the construction of the geothermal well. The drilling with aerated mud or aerated water may be used in lieu of mud drilling, but should be minimized to the extent practical. Should any [inadvertent] releases of steam occur during the drilling operations, the drilling fluid weight shall be immediately increased to stop the steam flow. In no case shall any inadvertent steam releases **result in hydrogen sulfide emissions of five (5.0) pounds per hour or more, or** exceed seven (7) minutes in duration in any one hour. If the inadvertent steam releases cannot be controlled by increasing the fluid weight or exceeds seven (7) minutes in duration **in any one hour**, the permittee shall take immediate action to shut-in the well.

Records of each steam release incident shall be maintained and include as a minimum, date, time and duration of the incident, the estimated resultant emissions, and any corrective measures taken. The records shall be in a permanent form suitable for inspection, shall be made available upon request by the Department of Health, and shall be retained for at least three (3) years following the date of such records.

18. Steam production rates and hydrogen sulfide concentrations shall be measured to determine hydrogen sulfide emissions in pounds per hour. A sodium hydroxide treatment mole ratio of 4 to 1 (NaOH/H2S) will be used initially and the abatement efficiency monitored. The optimum mole ratios will be determined during the hydrogen sulfide abatement operations. A specific chemical treatment plan shall be submitted to the Department of Health prior to the commencement of flow testing. A copy of the plan shall

be maintained at the site at all times and supervisory personnel shall be aware of its provisions at all times.

19. The permittee shall promptly notify the Department of Health should any toxic emissions be encountered of public health concern and where dispersion into the ambient air was the mitigative action.

20. The permittee shall perform once on each well, testing and analyses for all of the following constituents of the steam condensate, steam, particulates and/or gases emanating from each well:

| **STEAM CONDENSATE/TOTAL STEAM** | **GAS PHASE** |
|---|---|
| Benzene | Benzene |
| Ammonium (Total) | Hydrogen Sulfide |
| Arsenic | Ammonia |
| Lead | Radon 222 and daughters |
| Cadmium | Mercury Vapor |
| Bicarbonate and Carbonate | Methane |
| Sulfates | Non-Methane Hydro-carbons |
| Chlorides | Carbon dioxide |
| Nitrates | Sulfur dioxide |
| Boron (Total) | NESHAPS - pollutants as requested |
| Hydrogen Sulfide (Total) | |
| Fluorides (Total) | |
| Total Sulfur | |
| Mercury (Total) | |
| pH | |
| Total Dissolved Solids | |
| Total Suspended Solids | |
| Percent Noncondensibles | |

21. The drilling rig diesel engine generators and pumps shall be fired only on diesel fuel oil no. 2 with a maximum sulfur content not to exceed 0.5 percent by weight. The permittee shall maintain records on the total amount of fuel oil consumed by all the diesel engines for the drilling of each well. The total gallons of fuel oil consumed shall be submitted to the Department of Health at the completion of each well.

22. Unabated well venting shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for good dispersion and minimal air quality impact. In no case shall the well venting commence if the average wind speed at the well site is less than 4 meters per second **(8.9 miles per hour)**. Prior to well venting, the Department must be informed in writing a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum of 24-hours in advance of open venting of each well and pipeline cleanout. In preparation for flow testing, each well shall be allowed to open vent only during the daytime and no more than a total of four (4) hours.

    In no case shall any well venting coincide with any pipeline cleanouts or well flow testing operations, or commence if the power plant emergency steam release facility is being

utilized. If emergency steam releases from the power plant occur during the venting of any well, venting of that well shall be terminated as quickly as practical.

23. [Should any of the air quality monitoring stations indicate an ambient hydrogen sulfide, one-hour average concentration greater than 100 ppb, the permittee shall take immediate action to the extent practical to reduce all wellfield emissions. Within four (4) hours of the exceedance, the permittee shall reduce all wellfield hydrogen sulfide emissions associated with wellfield construction operations, including but not limited to drilling, flow testing, venting, etc., by a minimum of 50 percent of the level during the event. Following the reduction in project emissions, if the monitoring stations still indicate ambient hydrogen sulfide concentrations in excess of 100 ppb (one-hour average), the permittee shall cease all drilling operations and shut-in all wells under construction, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to monitoring site. If the project emissions have been reduced, the permittee shall maintain the emissions at this reduced level until such time the Department of Health is assured that the resumption of full activity shall not result in another exceedance of the ambient level of 100 ppb (one-hour average).]

    **In no case shall the well drilling, flow testing, venting operations, or well equipment failure or malfunction of any of the fourteen (14) geothermal exploratory/developmental wells cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average at or beyond the project boundary. Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 100 ppb (including background) on a one-hour average, the permittee shall immediately notify the Department of Health, ceasing all well drilling with aerated mud or aerated water, well flow testing, and well venting operations, and shutting in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected wellfield construction activities shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the contributions from the well drilling with aerated mud or aerated water, well flow testing, well venting operations or well equipment repair will not result in or contribute to the exceedance of the hydrogen sulfide ambient concentration of 100 ppb (including background) on a one-hour average.**

    The permittee shall submit to the Department of Health a written follow-up report within [two (2)] **five (5)** days of the occurrence. The report shall include the date, time and duration of the exceedance(s), the status of all project operations during the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense to any violation(s) of this permit or of any law or regulations.

24. [The drilling, flow testing, and venting operations of any of the fourteen (14) geothermal exploratory/developmental wells shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb on a one-hour average at or beyond the project boundary.]

25. The permittee may be required to install a control system acceptable to the Department of Health for the rapid throttling of steam flow and well shut-in on each developmental well prior to the well being connected to a resource distribution system. The requirement for a control system may be so specified in the subsequent Permit to Operate.

26. To prevent well blowouts, the permittee shall employ good drilling practices with proper blowout prevention equipment and experienced personnel in the drilling of the exploratory/developmental wells. Drilling supervisors shall be certified in blowout prevention at a minimum of once every two years by a recognized training center. In the unlikely event of a well blowout, the permittee shall immediately proceed with measures to kill or gain control of the well and notify the Department of Health.

    The permittee shall submit to the Department of Health a written report within five (5) days of the blowout. The report shall include, as a minimum, the probable cause of the blowout, the actions that have or will be taken, the estimated time before the well is controlled, an analysis of the air quality impact from the unabated emissions, and a monitoring plan to determine the actual air quality impact resulting from the blowout. A status report shall be submitted to the Department of Health on a weekly basis until such time the control of the well is established.

27. During those periods of normal power plant and **normal** wellfield operation**s**, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant **(A-834)** and associated wellfield **(A-833)** shall not cause an increase in the **[**ambient**]** hydrogen sulfide **ambient** concentration in excess of 5 ppb **[**(one-hour average)**]** (above background) **on a one-hour average** at or beyond the project boundary **as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report**. **[**During those periods when geothermal well drilling. well flow testing, or emergency steam release may be occurring, whether separately, in any combination, or whether in combination with periods of normal power plant or wellfield operation, the combined emissions of hydrogen sulfide from these sources shall not cause an increase in the ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background at or beyond the project boundary.**]** **As used in this context, a normal power plant operation is a power plant which is operating without any upsets, equipment failure, malfunction or which is otherwise operating normally. A normal wellfield operation is a wellfield in which no well drilling, flow testing, or venting activities are occurring and where the completed wells are not experiencing any equipment failure or malfunction and are either shut-in, being used as an injection well, or connected to a sound geothermal resource distribution system.**

28. **[**For any ambient hydrogen sulfide concentration in excess of 5 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide impact in excess of 5 ppb (one-hour average), or proving that the power plant or wellfield had experienced an operational upset, equipment failure, malfunction or was otherwise not operating normally. For any ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide concentration in excess of 25 ppb (one-hour average), or proving that the measured impact occurred during the vertical venting of a geothermal well or cleanout of the steam production pipelines.**]**

    **Excluding periods of well venting and pipeline cleanout, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report.**

**Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 25 ppb (above background) on a one-hour average, the permittee shall immediately notify the Department of Health and the Hilo District Health Office and shall cease all geothermal well drilling with aerated mud or aerated water, well flow testing, and scheduled project maintenance, and shut-in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected well drilling, flow testing, scheduled maintenance, and well equipment repair shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the hydrogen sulfide emissions from the affected well drilling, flow testing, scheduled maintenance, well equipment or power plant repairs, power plant emergency steam release, or normal power plant operation, whether separately or in any combination, did not or will not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average.**

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

March 16, 1990

90-A100
File #834

Mr. Maurice A. Richard
Regional Development Manager
Puna Geothermal Venture
101 Aupuni Street, Suite 1014-B
Hilo, Hawaii 96720

Dear Mr. Richard:

Subject: Modification to Authority to Construct No. A-834-796
25 MW Geothermal Power Plant
Located at TMK: 1-4-01:2 and 1-4-01:19, Kilauea Lower East Rift Zone, Puna, Hawaii

Pursuant to Chapter 342B, Hawaii Revised Statutes, and Chapter 11-60, Hawaii Administrative Rules, the Department of Health (DOH) hereby modifies the subject Authority to Construct No. A-834-796.

The following modified special conditions supersede the corresponding special conditions of Attachment II issued with ATC No. A-834-796 dated February 6, 1990:

Special Condition No. 6

Pipeline cleanouts shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for good dispersion and minimal air quality impact. In no case shall any pipeline cleanout commence if the average wind speed at the pipeline exhaust site is less than four (4) meters per second (8.9 miles per hour). In no case shall any pipeline cleanout coincide with any well venting, well flow testing, or well drilling with aerated water or aerated mud. Prior to any pipeline cleanout, the Department of Health must be informed in writing, a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum of 24-hours in advance of any pipeline cleanout. Each pipeline cleanout shall not exceed 20 minutes in duration and shall occur only in the daytime.

Special Condition No. 7

The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the wellfield may be used towards fulfilling this requirement.

Prior to the commencement of construction, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of plant operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. As a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

The air quality monitors shall be equipped with an alarm or acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide concentrations in excess of 25 ppb (above background) and 100 ppb (including background) on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of any exceedance above 25 ppb (above background) and 100 ppb (including background) on a one-hour average.

Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

Special Condition No. 13

The permittee shall immediately notify the Department of Health of any operational upsets, equipment failure or malfunction which would allow an increase in the emissions of hydrogen sulfide, particulate matter or isopentane. The permittee shall apply best available control technology for the air emissions and take immediate steps to correct the condition. The permittee shall take appropriate action in accordance with Special Condition Nos. 15, 17 and 18 if the hydrogen sulfide ambient concentration exceeds the specified limits in Special Condition Nos. 15, 17 and 18. In addition, a written report shall be submitted to the Department of Health within five (5) days of the occurrence. The report shall include a description of the malfunctioning equipment or

abnormal operation, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the methods utilized to restore normal operations. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order which results from the operational upset, equipment failure or malfunction.

Special Condition No. 15

The operation of the 25 MW geothermal power plant during periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average at or beyond the project boundary. Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 100 ppb (including background) on a one-hour average, the permittee shall take immediate action terminating, within two (2) hours of the exceedance, all power plant activities not associated with normal power plant operations and contributing to hydrogen sulfide emissions. Following the reduction in project emissions, if the monitoring stations still indicate hydrogen sulfide ambient concentrations in excess of 100 ppb (including background) on a one-hour average, the permittee shall curtail the power plant operations, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to the monitoring site. If the hydrogen sulfide ambient concentration is below 100 ppb (including background) on a one-hour average after the project emissions have been reduced, the permittee shall maintain the emissions at this reduced level until such time the Department of Health is assured that the resumption of full activity shall not result in another exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average.

The permittee shall submit a written report to the Department of Health within five (5) days of the occurrence. The report shall include the date, time and duration of the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions taken to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation (s) of this permit, law, rule or order.

Special Condition No. 17

During those periods of normal power plant and normal wellfield operations, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the hydrogen sulfide ambient concentration in excess of 5 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly

monitoring report. As used in this context, a normal power plant operation is a power plant which is operating without any upsets, equipment failure, malfunction or which is otherwise operating normally. A normal wellfield operation is a wellfield in which no well drilling, flow testing, or venting activities are occurring and where the completed wells are not experiencing any equipment failure or malfunction and are either shut-in, being used as an injection well, or connected to a sound geothermal resource distribution system.

Special Condition No. 18

Excluding periods of well venting and pipeline cleanout, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report.

Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 25 ppb (above background) on a one-hour average, the permittee shall immediately notify the Department of Health and the Hilo District Health Office and shall cease all geothermal well drilling with aerated mud or aerated water, well flow testing, and scheduled project maintenance, and shut-in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected well drilling, flow testing, scheduled maintenance, and well equipment repair shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the hydrogen sulfide emissions from the affected well drilling, flow testing, scheduled maintenance, well equipment or power plant repairs, power plant emergency steam release, or normal power plant operation, whether separately or in any combination, did not or will not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average.

The following special condition of Attachment II issued with ATC No. A-834-796 dated February 6, 1990 is hereby deleted:

Special Condition No. 16

The operation of the 25 MW geothermal power plant during periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb on a one-hour average at or beyond the project boundary.

All other special conditions of Attachment II (Special Condition Nos. 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 14, 19 and 20) issued with ATC No. A-834-796 dated February 6, 1990 shall not be affected and shall remain valid.

These modifications shall become final twenty (20) days after receipt, unless before the twenty (20) days expire, Puna Geothermal Venture submits a written request to the Director of Health for a hearing pursuant to Chapters 91 and 342B, Hawaii Revised Statutes. If a hearing is requested, it will be held at a date, time, and place to be specified later and conducted in accordance with Chapter 91, Hawaii Revised Statutes, and the rules of Practice and Procedure of the Department of Health.

Very truly yours,

JOHN C. LEWIN, M.D.
Director of Health

WN/sk
cc: DHSA, Hawaii

Dean

COPY FOR YOUR INFORMATION

March 16, 1990
Ramseyer

**ATTACHMENT II. SPECIAL CONDITIONS OF AUTHORITY TO CONSTRUCT, NO. A-834-796**
**APPLICATION NO. A-834**
**POWER PLANT**

In addition to the standard conditions of the Authority to Construct, this permit is subject to the following special conditions:

1. The permit conditions prescribed herein may at any time be revised by the Department of Health to conform to any Federal or State promulgated air quality rules on geothermal facilities.

2. The total fugitive isopentane emissions from all ten (10) Ormat Energy Converter (OEC) modules shall not exceed 0.4 lbs/hr or exceed 1000 ppm from any seal, flange, valve or any other fugitive emission point when measured from a distance of two (2) inches from the point. The permittee shall perform measurements on all fugitive isopentane emission points, as a minimum, on a weekly basis. The permittee shall take immediate corrective actions upon identifying any isopentane emissions in excess of 1000 ppm when measured from a distance of two (2) inches.

3. Records shall be maintained on all isopentane emission measurements, the amount of gallons of isopentane purchased, the amount of isopentane transferred to and from the OEC modules, and the amount of isopentane released to the atmosphere. The records shall be in a permanent form suitable for inspection, shall be made available upon request by the Department of Health, and shall be retained for at least three (3) years following the date of such records. A report on the amount of isopentane released to the atmosphere shall be submitted to the Department of Health on an annual basis.

4. The geothermal fluids injection system shall include at least two (2) geothermal injection wells, a spare fluid pump, and a spare noncondensable gas compressor. The backup injection system equipment shall be maintained in good operating condition at all times and shall be utilized immediately upon identification of any malfunctioning equipment.

   In the event of an equipment malfunction or upset condition which results in a situation where the two geothermal injection wells are not capable of handling the total geothermal resource being utilized by the power plant, the power plant production and the associated geothermal resource being used shall be immediately reduced accordingly to the handling capacity of the two injection wells.

5. The diesel engine generator and the diesel firewater pump shall be fired only on diesel fuel oil no. 2 with a maximum sulfur content not to exceed 0.5% by weight.

6. Pipeline cleanouts shall be allowed only after the permittee has checked with the National Weather Service and is assured of meteorological conditions appropriate for good dispersion and minimal air quality impact. In no case shall any pipeline cleanout commence if the average wind speed at the pipeline exhaust site is less than four (4) meters per second **(8.9 miles per hour)**. In no case shall any pipeline cleanout coincide with any well venting, well flow testing, or well drilling with aerated water or aerated mud. Prior to any pipeline cleanout, the Department of Health must be informed in writing, a minimum of two (2) days prior to commencement and so concur. The public shall be notified a minimum of 24-hours in advance by notices in the newspapers of general circulation in Hawaii County. In addition, the permittee shall make a

reasonable effort to notify all residents living within 3,500 feet of the permittee's property boundary a minimum of 24-hours in advance of any pipeline cleanout. Each pipeline cleanout shall not exceed 20 minutes in duration and shall occur only in the daytime.

7. The permittee shall install, operate, and maintain a minimum of one (1) meteorological and three (3) air quality monitoring stations. The monitoring stations required in any permit for the wellfield may be used towards fulfilling this requirement.

   Prior to the commencement of construction, the permittee shall submit for the Department of Health's approval the siting of the air quality and meteorological monitoring stations. The air quality and meteorological monitoring stations shall be fully operational prior to the commencement of plant operations. The permittee shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The measured data shall meet U.S. EPA capture requirements and quality assurance guidelines. As a minimum, a quality assurance check shall be conducted on each monitoring station every-other-day.

   The air quality monitors shall be equipped with an alarm or acceptable equivalent system that will immediately notify the permittee of ambient hydrogen sulfide concentrations in excess of 25 ppb **(above background)** and 100 ppb **(including background)** on a one-hour average. The permittee shall immediately notify the Department of Health and the Hilo District Health Office of any exceedance above **25 ppb (above background) and** 100 ppb **(including background) on a one-hour average.**

   Two (2) copies of the data file in a format acceptable to the Department of Health shall be submitted on an annual basis. The data file shall be in a format that can be utilized by a personal computer for ready extraction of data. The air quality and meteorological data shall be summarized and submitted monthly in writing to the Department of Health. Additional information on the monitoring stations and on the data collected shall be submitted upon request by the Department of Health.

8. At the discretion of the Director of Health the permittee may at any time be required to install, operate, and maintain additional air quality and meteorological monitoring stations, but only after due notice to the permittee on the reasons for the proposed change and providing the permittee an opportunity to respond within seven (7) days.

9. All access roads into the permittee's property shall be limited to authorized personnel only. Twenty-four hour staffing shall be in place during plant operations.

10. The emergency steam release facility, consisting of two (2) rock mufflers, chemical storage tank(s) and associated equipment, shall be installed, maintained, and be fully operational prior to commencement of plant operations. Each rock muffler shall be capable of handling a steam flow rate of 570,000 lbs/hr or 100 percent of the total power plant steam flow, whichever is greater.

11. The emergency steam release facility shall only be utilized under one or more of the following conditions:

    a) Failure of the electrical transmission lines out of the power plant or some incident that tripped all the steam turbines and OEC units;

    b) Complete upset of the geothermal fluid injection system;

c) Pressure in the steam lines exceeds safety design set points; or

d) Any upset situation which would otherwise result in a release of unabated steam to the atmosphere.

12. The emergency steam release facility shall be equipped and maintained at all times with a minimum three-day operating storage capacity of sodium hydroxide. The chemical abatement system shall operate automatically when steam is released through the rock muffler(s). The hydrogen sulfide concentrations shall be continuously monitored both downstream and upstream of the chemical injection point. A sodium hydroxide treatment mole ratio of 4 to 1 ($NaOH/H_2S$) will be used initially and the abatement efficiency monitored. The optimum mole ratios will be determined during the hydrogen sulfide abatement operations.

Upon utilizing the emergency steam release facility, the permittee shall take immediate action to the extent practical to reduce the steam flow and perform the necessary corrective actions. The steam flow rate shall be reduced, as a minimum, to 50 percent of full flow within four (4) hours after initiating the use of the emergency steam release facility.

13. The permittee shall immediately notify the Department of Health of any operational upsets, equipment failure or malfunction which would allow an increase in the emissions of hydrogen sulfide, particulate matter or isopentane. **The permittee shall apply best available control technology for the air emissions and take immediate steps to correct the condition. The permittee shall take appropriate action in accordance with Special Condition Nos. 15, 17 and 18 if the hydrogen sulfide ambient concentration exceeds the specified limits in Special Condition Nos. 15, 17 and 18.** In addition, a written report shall be submitted to the Department of Health within five (5) days of the occurrence. The report shall include a description of the malfunctioning equipment or abnormal operation, the date of the initial failure, the estimated resultant emissions, time and duration of the event, and the methods utilized to restore normal operations. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order which results from the operational upset, equipment failure or malfunction.

14. The permittee shall maintain a 24-hour telephone service to accept calls concerning this Authority to Construct. This telephone number must be fully operational prior to commencement of construction.

15. [Should any of the air quality monitoring stations indicate an ambient hydrogen sulfide, one-hour average concentration greater than 100 ppb, the permittee shall take immediate action to the extent practical to reduce all power plant emissions. Within four (4) hours of the exceedance, the permittee shall terminate all power plant activities not associated with normal power plant operations and contributing to hydrogen sulfide emissions. Following the reduction in project emissions, if the monitoring stations still indicate ambient hydrogen sulfide concentrations in excess of 100 ppb (one-hour average), the permittee shall curtail the power plant operations, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to monitoring site. If the ambient hydrogen sulfide concentration is below 100 ppb (one-hour average) after the project emissions have been reduced, the permittee shall maintain the emissions at this reduced level until such time the Department of Health is assured that the

resumption of full activity shall not result in another exceedance of the ambient level of 100 ppb (one-hour average).]

**The operation of the 25 MW geothermal power plant during periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average at or beyond the project boundary. Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 100 ppb (including background) on a one-hour average, the permittee shall take immediate action terminating, within two (2) hours of the exceedance, all power plant activities not associated with normal power plant operations and contributing to hydrogen sulfide emissions. Following the reduction in project emissions, if the monitoring stations still indicate hydrogen sulfide ambient concentrations in excess of 100 ppb (including background) on a one-hour average, the permittee shall curtail the power plant operations, unless the permittee can conclusively show to the Department of Health that the project operations and emissions are not contributing any impact to the monitoring site. If the hydrogen sulfide ambient concentration is below 100 ppb (including background) on a one-hour average after the project emissions have been reduced, the permittee shall maintain the emissions at this reduced level until such time the Department of Health is assured that the resumption of full activity shall not result in another exceedance of the hydrogen sulfide ambient level of 100 ppb (including background) on a one-hour average.**

The permittee shall submit a written report to the Department of Health within [two (2)] **five (5)** days of the occurrence. The report shall include the date, time and duration of the exceedance, the estimated project emissions and any other emission sources that may have contributed to the exceedance, and all corrective measures and actions taken to reduce project emissions to a minimum. Compliance with this notification provision shall not excuse or otherwise constitute a defense for any violation(s) of this permit, law, rule or order.

16. [The operation of the 25 MW geothermal power plant during periods of operational upsets, equipment failure or malfunctions shall not cause or contribute to an exceedance of the hydrogen sulfide ambient level of 100 ppb on a one-hour average at or beyond the project boundary.]

17. During those periods of normal power plant and **normal** wellfield operations, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant **(A-834)** and associated wellfield **(A-833)** shall not cause an increase in the [ambient] hydrogen sulfide **ambient** concentrations in excess of 5 ppb [(one-hour average)] (above background) **on a one-hour average** at or beyond the project boundary **as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report.** [During those periods when geothermal well drilling, well flow testing, or emergency steam release may be occurring, whether separately, in any combination, or whether in combination with periods of normal power plant or wellfield operation, the combined emissions of hydrogen sulfide from these sources shall not cause an increase in the ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background at or beyond the project boundary.] **As used in this context, a normal power plant operation is a power plant which is operating without any upsets, equipment failure, malfunction or which is otherwise operating normally. A normal wellfield operation is a wellfield in which no well drilling, flow testing, or venting activities are occurring and where the completed wells are not experiencing any equipment failure or malfunction and are either shut-in,**

**being used as an injection well, or connected to a sound geothermal resource distribution system.**

18. [For any ambient hydrogen sulfide concentrations in excess of 5 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide impact in excess of 5 ppb (one-hour average), or proving that the power plant or wellfield had experienced an operational upset, equipment failure, malfunction or as otherwise not operating normally. For any ambient hydrogen sulfide concentration in excess of 25 ppb (one-hour average) above background as indicated by any air quality monitoring station, the permittee has the burden of proving that operation of the 25 MW geothermal power plant and wellfield did not cause the hydrogen sulfide concentration in excess of 25 ppb (one-hour average), or proving that the measured impact occurred during the vertical venting of a geothermal well or cleanout of the steam production pipelines.]

**Excluding periods of well venting and pipeline cleanout, the combined emissions of hydrogen sulfide from the 25 MW geothermal power plant (A-834) and associated wellfield (A-833) shall not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average at or beyond the project boundary as monitored at any of the approved air quality monitoring stations and so identified in the monthly monitoring report.**

**Should any of the approved air quality monitoring stations indicate a hydrogen sulfide ambient concentration greater than 25 ppb (above background) on a one-hour average, the permittee shall immediately notify the Department of Health and the Hilo District Health Office and shall cease all geothermal well drilling with aerated mud or aerated water, well flow testing, and scheduled project maintenance, and shut-in those wells experiencing equipment failure or malfunction, which result in emissions of hydrogen sulfide. The affected well drilling, flow testing, scheduled maintenance, and well equipment repair shall be allowed to proceed only after the permittee has satisfactorily demonstrated to the Department of Health that the hydrogen sulfide emissions from the affected well drilling, flow testing, scheduled maintenance, well equipment or power plant repairs, power plant emergency steam release, or normal power plant operation, whether separately or in any combination, did not or will not cause an increase in the hydrogen sulfide ambient concentration in excess of 25 ppb (above background) on a one-hour average.**

19. During normal power plant operations, the hydrogen sulfide emissions from the 25 MW geothermal power plant shall not exceed one pound per hour (three-hour average). During periods of malfunction or regularly scheduled maintenance, best available control technology shall be applied for the hydrogen sulfide emissions.

20. The Department of Health may at any time with reasonable cause, request the permittee to install, operate, and maintain emission monitors to continuously measure and record the hydrogen sulfide and isopentane emissions at any specified location in the power plant.